ABSTRACT:
Many prognostic models for cancer use biomarkers that have utility in early detection. These models are often interpreted as indicating that detecting disease at a lower biomarker threshold generates a greater survival benefit. However, lowering the threshold of the biomarker is tantamount to early detection. Do the existing prognostic models imply a survival benefit under early detection once lead time is accounted for? In the first half of the talk, we examine this question and show that the benefit depends not only on the parameters of the prognostic model, but also on biomarker growth and that early detection does not necessarily imply survival extension.

Next, we examine modeling of disease progression in active surveillance (AS) studies. Prostate cancer grade describes how abnormal the tumor tissue and cells appear, and it is an important prognostic indicator of disease progression. Whether prostate tumors change grade is a question that has important implications for disease surveillance and treatment. Longitudinal data on tumor grade are available from men biopsied regularly as part of AS programs, but subject to misclassification. We develop models that allow for estimation of the time of grade change while accounting for biopsy misclassification error. Although our results are sensitive to prior specifications, they indicate that in a nontrivial fraction of the patient population, tumor grade can progress.